Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte THOMAS C. KIRK
and
DAVID WITIAK

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Appeal No. 1997-2446
Application 08/223,351

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ON BRIEF

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Before KIMLIN, JOHN D. SMITH and WALTZ, Administrative Patent Judges.

JOHN D. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal pursuant to 35 U.S.C. § 134 from the final rejection of claims 1 and 4 through 24.

The subject matter on appeal is related to a process for producing a low molecular weight copolymer product containing relatively low levels of a monoethylenically unsaturated dicarboxylic acid monomer component. Representative appealed claim 1 is reproduced below:

1. A polymerization process, comprising:

a) establishing an initial charge of water in a reactor;

b) adding into the reactor to form a reaction mixture

i) at least one water soluble chain transfer agent selected from alkali metal salts of sulfites;

ii) at least one water soluble initiator,

iii) at least one metal promoter,

iv) from about 50 to about 97 weight percent, based on the total weight of monomer added to the reactor, of at lest one water soluble monoethylenically unsaturated monocarboxylic acid monomer,

v) from about 3 to about 50 weight percent, based on the total weight of monomer added to the reactor, of at least one monoethylenically unsaturated dicarboxylic acid monomer, and

vi) from 0 to about 40 weight percent, based on the total weight of monomer added to the

reactor, of one or more water soluble carboxyl-free monoethylenically unsaturated monomers, wherein the total weight percent of monomers iv), v), and vi) equals 100 weight percent;

c) maintaining the reaction mixture at a temperature of from about 60° to about 120°C over a reaction time;

d) maintaining the reaction mixture at a pH of 3 or less over the reaction time; and

e) recovering a water soluble polymer product having a weight average molecular weight less than 30,000; wherein the chain transfer agent, initiator, and monoethylenically unsaturated monocarboxylic acid monomer iv) are added to the reactor over at least 25 percent of the reaction time.

The references of record relied upon by the examiner are:

Hughes et al. (Hughes)	5,100,980	Mar. 31, 1992
Seelmann-Eggeberg et al. (SE)	5,104,951	Apr. 14, 1992
Holy et al. (Holy)	5,268,437	Dec. 7, 1993

The appealed claims stand rejected under 35 U.S.C. § 103 as unpatentable over the combined teachings of Hughes, Holy and SE.

Because we agree with the examiner's ultimate legal conclusion that the claimed subject matter defined by appealed claim 1 would have been obvious within the meaning of 35 U.S.C. § 103 in view of the combined teachings of the relied upon prior art references, we will sustain the rejection of appealed

claim 1. Since the dependent claims stand or fall with appealed claim 1, we necessarily sustain the rejection of all other claims on appeal.

As evidence of the obviousness of the herein claimed process, the examiner relies upon the combined teachings of Hughes, Holy and SE. Similar to appellants' claimed process which is directed to producing a relatively low weight average molecular weight (less than 30,000) water soluble copolymer product containing relatively low levels (from about 3 to 50 weight percent) of monoethylenically unsaturated dicarboxylic acid units and relatively high levels (from about 50 to 97 weight percent) of monoethylenically unsaturated monocarboxylic acid units, Hughes discloses a process with an identical object, i.e., the production of a low molecular weight water soluble copolymer product containing relatively low

levels (from about 3 to 25 weight percent) of monethylenically unsaturated dicarboxylic acid units, such as maleic acid, and relatively high levels (from about 75 to 97 weight percent) of monoethylenically unsaturated monocarboxylic acid units, such as acrylic acid. See column 2, lines 59 through 64, of Hughes. In this regard, the copolymers produced by EXAMPLES 1, 7, 9, and 12 of Hughes each have a weight average molecular weight of less than 30,000, and Figure 1 of Hughes demonstrates how the use of a copper metal promoter "allows for better control of the molecular weight over a wide
range of maleic acid content in the copolymer." See column 5, lines 49 through 56, of Hughes. Accordingly, while appellants argue that the attainment of a low molecular weight copolymer containing low amounts of monoethylenically unsaturated dicarboxylic acid monomer is not a trivial problem, Hughes has disclosed a prior art process for achieving this goal.

In addition to the monomer components and the copper promoter, the reaction mixture of Hughes also includes water soluble initiators. See column 4, line 6, and line 66 to column 5, line 7, of Hughes. The Hughes polymerization reaction is conducted within a

temperature from 80° to 150°C and preferably from 90° to 120°C, and the pH of the Hughes reaction solution is maintained in the range of from 3 to 7. See column 5, lines 15 through 18, and column 5, lines 33 and 34, respectively. Contrary to appellants' arguments that Hughes teaches away from operating at a pH of 3 or less, a claimed invention is rendered prima facie obvious by the teachings of a prior art reference, such as Hughes, that discloses a range that touches the range recited in the claim. See In re Malagari, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974). Also, see In re Geisler, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997).

Accordingly, the examiner correctly found that the herein claimed process is essentially disclosed by Hughes with the exception of the requirement of appellants' process claims relating to the addition to the reaction mixture of "at least one water soluble chain transfer agent selected from alkali metal salts of sulfites" (appealed claim 1) which claimed phrase is inclusive of "alkali metal salts of metabisulfites and bisulfites" (appealed claim 4).

With respect to this claimed deficiency in the Hughes disclosure, the examiner contends that the use of alkali metal

sulfites as chain transfer agents for forming low molecular weight polymers is well known (answer, page 3), and appellants have raised no challenge to the examiner's finding. Indeed, Holy discloses that sulfites are commonly used chain transfer agents for achieving low molecular weight polymers. See column 1, line 66, to column 2, line 12, of Holy. Moreover, notwith- standing their known drawbacks, Holy teaches that, if desired, such chain transfer agents may be used in conjunction with Holy's "high temperature" polymerization process for producing low

molecular weight copolymers. See column 6, lines 48 through 57, of Holy. In a similar manner, SE discloses that "regulators" (i.e., chain transfer agents) may be used in the polymerization process conducted at temperatures from 20° to 200°C and at a pH range of from 2 to 9. See SE, column 6, lines 15 and 16; column 7, lines 16 through 18; and column 8, lines 7 through 31.

In light of these disclosures, we agree with the examiner that it would have been prima facie obvious to a person of ordinary skill in this art to have used a sulfite chain transfer agent as a further means of controlling and producing the desired low molecular

weight copolymer in the process disclosed by Hughes. In reaching our conclusion that the herein claimed process would have been prima facie obvious in view of the combined teachings of the references, we have not ignored appellants' argument that one of ordinary skill in the art would not expect that a sulfite chain transfer agent would function in that capacity in the presence of a monoethylenically unsaturated dicarboxylic acid monomer. In this regard, appellants have cited an excerpt from Maleic Anhydride by B. C. Trivedi, published in Plenum, New York (1982), page 53, which indicates that maleic acid and other related compounds when treated with sodium sulfite

or sodium bisulfite form an addition product. However, without further explanation in the reference regarding specific condi- tions, one of ordinary skill in the art may very well read this disclosure as simply and implicitly explaining the mechanism by which the sodium sulfite or sodium bisulfite functions as a chain transfer agent in the presence of maleic acid. As pointed out by Holy, common chain transfer agents such as bisulfites are known to impart

functionality to the polymer and can introduce salts into the product. Again, see Holy at column 2, lines 8 through 12.

Appellants contend that even if a prima facie case of obviousness has been established from the combined teachings of Holy, Hughes and SE, evidence of unexpected results found in TABLE 2 and TABLE 1 of the specification at pages 31 and 27, respectively, are adequate to rebut the prima facie case of obviousness. Initially, and contrary to appellants' arguments, in submitting evidence to establish unobvious results, it is appellants that have the burden of indicating how the examples asserted to represent the claimed process are considered to relate to the examples intended to represent prior art, and particularly to indicate how the prior art examples represent the closest prior art. Moreover, such evidence relied upon must

also be reasonably commensurate in scope to the subject matter claimed. Further, such evidence should establish that the differences in results obtained are in fact unexpected to a person of ordinary skill in the art and are of practical significance. See Ex parte Gelles, 22 USPQ2d 1318, 1319 (Bd.

Pat. App. & Int. 1992) and cases cited therein. We have carefully considered appellants' arguments regarding the showing of unexpected results in their specification. However, it is our view that appellants have failed to meet their legal burden in the above respects.

Specifically, appellants contend that the data in TABLE 2 indicates that by operating within the claimed requirements, polymers having low molecular weights and low color are unexpectedly obtained in comparison to the prior art. First of all, we point out that both Hughes and Holy exemplify and describe processes wherein the same copolymer products are produced having a weight average molecular weight of 30,000 or less. Again, see the copolymers produced by EXAMPLES 1, 7, 9, and 12 of Hughes and the disclosure of Holy at column 1, lines 6 through 13. With respect to the alleged production of a copolymer having an unexpectedly low color, i.e., a standard number of less than 5, we point out that nothing in the appealed claims requires the production of a copolymer product having a color of any degree. Moreover, the specific examples exemplifying the production of a copolymer product having this allegedly unexpectedly low color are produced by running the process at a pH of

1.4 and 1.0. See EXAMPLES 9 and 11, respectively. Based on these limited showings, it is not apparent to us, and appellants have not attempted to establish, that the probative value of the evidence based upon these pH limited experiments can be reasonably extrapolated to the appealed claims which are of considerably broader scope. Further, we point out that merely stating, as appellants have, that it is an "advantage" to the process of the present invention that the polymer product produced by the process is lower in color is not an unequivocal statement that appellants believe that the actual results shown would have been truly unexpected to a person of ordinary skill in this art. In this regard, see the discussion of the TABLE 1 results at page 27, last two lines.

Upon consideration anew of the evidence of obviousness relied upon by the examiner, and weighing such evidence of obviousness against the evidence of nonobviousness relied upon by appellants, it is our judgment that the evidence of obviousness outweighs the evidence of nonobviousness. We, therefore, agree

with the examiner's conclusion that one having ordinary skill in the art would have found the claimed invention as a whole obvious within the meaning of 35 U.S.C. § 103.

The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN)
Administrative Patent Judge)
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) BOARD OF PATENT
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Administrative Patent Judge) INTERFERENCES
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THOMAS A. WALTZ)
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